



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/624,408 | 07/21/2003 | Chet R. Douglas | P16578 | 6803 |
| 7590 | 06/12/2006 | | EXAMINER | |
| David Victor, Esq Ste. 210 315 South Beverly Dr. Beverly Hills, CA 90212 | | | | SORRELL, ERON J |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2182 | |

DATE MAILED: 06/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|-----------------|------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/624,408 | DOUGLAS, CHET R. |
| | Examiner | Art Unit |
| | Eron J. Sorrell | 2182 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 29 March 2006.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-28 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-4,6-8,10-15,17-21,23-25,27 and 28 is/are rejected.
 7) Claim(s) 5,9,15,16,22 and 26 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 26 April 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date 20060323.
 5) Notice of Informal Patent Application (PTO-152)
 6) Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3,6,10,18-20,23,27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson (U.S. Patent No. 5,590,304) in view of Batchelor (U.S. Patent No. 5,278,984).

3. Referring to method claim 1, and article of manufacture claim 18, Adkisson teaches a method for managing requests to an Input/Output (I/O) device (see item 103 in figure 2), comprising:

queueing I/O requests directed to the I/O device (see lines 35-45 of column 5);

calculating a coalesce limit (see lines 40-54 of column 6); coalescing a number of queued I/O requests not exceeding the calculated coalesce limit into a coalesced I/O request (see lines 29-48 of column 6); and

Art Unit: 2182

transmitting the coalesced I/O request (see lines 35-45 of column 5).

Adkisson fails to explicitly set forth the limitation that calculating the coalesce limit is done in response to determining that a number of queued I/O requests exceeds a threshold, however Adkisson does teach determining when a threshold is reached, and continuing to receive I/O requests after the threshold has been reached and before the requests are burst transferred.

Batchelor teaches, in an analogous system, burst-transferring data after determining a threshold has been exceeded (see lines 9-13 of column 16).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the teachings of Adkisson with the above teachings of Batchelor. One of ordinary skill would have been motivated to such modification because Adkisson suggests the burst frequency is programmable providing operational flexibility.

4. Referring to method claim 2 and article of manufacture claim 19, Adkisson teaches the calculated coalesce limit dynamically varies based in part on the number of queued I/O requests (see equation 1 in column 6 and lines 55-67 of column

6).

5. Referring to method claim 3 and article of manufacture claim 20, Adkisson teaches wherein calculating the coalesce limit includes dividing the number of queued I/O requests by an interval (see equation 1 in column 6 and lines 55-67 of column 6).

6. Referring to method claim 6 and article of manufacture claim 23, Adkisson teaches adding the transmitted coalesced I/O request to the second queue (see paragraph bridging columns 5 and 6).

7. Referring to method claim 10 and article of manufacture claim 27, Adkisson teaches transmitting one I/O request from the queue if the number of queued I/O requests does not exceed the threshold (see lines 35-45 of column 5, note when the I/O rate exceeds the memory rate, the requests are sent every clock cycle).

8. Referring to claim 28, Adkisson teaches the device comprises a computer readable medium or a hardware component (see item 102 in figure 2).

9. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson in view of Batchelor as applied to claims 1 and 18 above and further in view of Gunlock et al. (U.S. Patent No. 5,522,054 hereinafter "Gunlock").

10. Referring to method claim 4 and article of manufacture claim 21, Adkisson teaches determining a maximum number of queue I/O requests up to the coalesce limit (see lines 29-48 of column 6), however the combination Adkisson and Batchelor is silent as to that storage requests being directed to data stored at sequential locations.

Gunlock teaches, in an analogous system, the above limitation (see lines 40-60 of column 2).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the combination of Adkisson and Batchelor with the above teachings of Gunlock. One of ordinary skill in the art would have been motivated to make such modification in order to improve disk drive performance as suggested by Gunlock (see paragraph bridging columns 2 and 3).

Art Unit: 2182

11. Claims 7,8,11-13,17,24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson in view Batchelor as applied to claims 1 and 18 above and further in view of Marcotte (U.S. Patent No. 6,292,856).

12. Referring to method claim 7 and article of manufacture 24, the combination of Adkisson and Batchelor teaches the method of claim 5 and article of manufacture of claim 18, and further teaches the second queue being implemented in a controller of the I/O device (see item 201 within item 102 in figure 2). The combination of Adkisson and Batchelor fails to teach the first queue being maintained by a device driver.

Marcotte teaches, in an analogous system, the above limitation (see item 74 within item 42 in figure 4).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the combination of Adkisson and Batchelor with the above teachings of Marcotte. One of ordinary skill in the art would have been motivated to make such modification selectively cancel or move the request to a difference device for servicing as suggested by Marcotte (see abstract).

Art Unit: 2182

13. Referring to method claim 8 and article of manufacture claim 25, Adkisson teaches the controller is a storage controller (see lines 6-24 of column 5), and the device is a storage device (see item 103 in figure 2).

14. Referring to claim 11, Adkisson teaches a system (see figure 1) for managing requests to a storage device (see item 103a in figure 1), wherein the storage controller manages access to the storage device, comprising:

 a processor (see item 101a in figure 1);
 a memory device accessible to the processor (see item 103a in figure 1);
 wherein the operations are performed, the operations comprising:

 queuing I/O requests directed to the I/O device (see lines 35-45 of column 5);
 calculating a coalesce limit (see lines 40-54 of column 6);
 coalescing a number of queued I/O requests not exceeding the calculated coalesce limit into a coalesced I/O request (see lines 29-48 of column 6); and
 transmitting the coalesced I/O request (see lines 35-45 of column 5).

Art Unit: 2182

Adkisson fails to explicitly set forth the limitation that calculating the coalesce limit is done in response to determining that a number of queued I/O requests exceeds a threshold, however Adkisson does teach determining when a threshold is reached, and continuing to receive I/O requests after the threshold has been reached and before the requests are burst transferred.

Batchelor teaches, in an analogous system, burst-transferring data after determining a threshold has been exceeded (see lines 9-13 of column 16).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the teachings of Adkisson with the above teachings of Batchelor. One of ordinary skill would have been motivated to such modification because Adkisson suggests the burst frequency is programmable providing operational flexibility.

The combination of Adkisson and Batchelor fails to teach the above operations are performed by a device driver executed by the processor.

Marcotte teaches, in an analogous system, the above limitation (see item 74 within item 42 in figure 4).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the

Art Unit: 2182

combination Adkisson and Batchelor with the above teachings of Marcotte. One of ordinary skill in the art would have been motivated to make such modification selectively cancel or move the request to a difference device for servicing as suggested by Marcotte (see abstract).

15. Referring to claim 12, Adkisson teaches the calculated coalesce limit dynamically varies based in part on the number of queued I/O requests (see equation 1 in column 6 and lines 55-67 of column 6).

16. Referring to claim 13, Adkisson teaches wherein calculating the coalesce limit includes dividing the number of queued I/O requests by an interval (see equation 1 in column 6 and lines 55-67 of column 6).

17. Referring to claim 17, Adkisson teaches transmitting one I/O request from the queue if the number of queued I/O requests does not exceed the threshold (see lines 35-45 of column 5, note when the I/O rate exceeds the memory rate, the requests are sent every clock cycle).

Art Unit: 2182

18. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson in view of Batchelor and further in view of Marcotte as applied to claim 11 above and further in view of Gunlock.

19. Referring to claim 14, Adkisson teaches determining a maximum number of queue I/O requests up to the coalesce limit (see lines 29-48 of column 6), however the combination of Adkisson and Marcotte fails to teach the storage requests being directed to data stored at sequential locations.

Gunlock teaches, in an analogous system, the above limitation (see lines 40-60 of column 2).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the combination of Adkisson and Marcotte with the above teachings of Gunlock. One of ordinary skill in the art would have been motivated to make such modification in order to improve disk drive performance as suggested by Gunlock (see paragraph bridging columns 2 and 3).

Allowable Subject Matter

20. Claims 5,9,15,16,22, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if

Art Unit: 2182

rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments/Amendment

21. Applicant's arguments, see last paragraph of page 10 and first full paragraph of claim 11, with respect to claims 5,15, and 22 have been fully considered and are persuasive. The rejection of 5,15, and 22 has been withdrawn.

22. Applicant's arguments with respect to claims 2,3,10,12,13,19,20, and 27, have been fully considered but are not persuasive. The applicant argues:

1) Adkisson fails to teach the calculated coalesce limit varies based on the number of queued request (see last paragraph of page 8);

2) Adkisson fails to teach the calculated limit includes dividing the queued I/O requests by an interval (see paragraph bridging pages 9 and 10);

3) Adkisson fails to teach transmitting one I/O request if the threshold is not reached (see 5th full paragraph on page 11).

23. As per arguments 1 and 2, the Examiner disagrees. At lines 50-55 of column 6, Adkisson discloses a formula for calculating

the maximum burst size. The equation comprises *the variable "N"* which represents the initial amount of data in the queue (emphasis added, see lines 40-49 of column 6), therefor the burst size varies with N, the number of requests. Adkisson's formula has the value A-1 in the denominator, wherein A is the clock cycle which is an interval of time.

24. As per argument 3, the Examiner disagrees. Adkisson teaches that the burst transfers occur only when the memory clock rate exceeds the I/O clock rate, and further teaches that these clock rates can be equal (see lines 35-45 of column 5). If the two clock rates are equal each request will get serviced as soon as it enters the queue and there will be no build up of requests in the queue, thus the threshold will not be reached.

25. Applicant's amendment has changed the scope of the invention because the pre-amended claims required only *conditionally calculating a coalesce limit based on whether or not* a determination is made. The claims now require calculating the coalesce limit *when* the determination is made.

Conclusion

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eron J. Sorrell whose telephone number is 571 272-4160. The examiner can normally be reached on Monday-Friday 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Huynh can be

Art Unit: 2182

reached on 571-272-4147. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EJS
June 7, 2006


KIM HUYNH
SUPERVISORY PATENT EXAMINER
